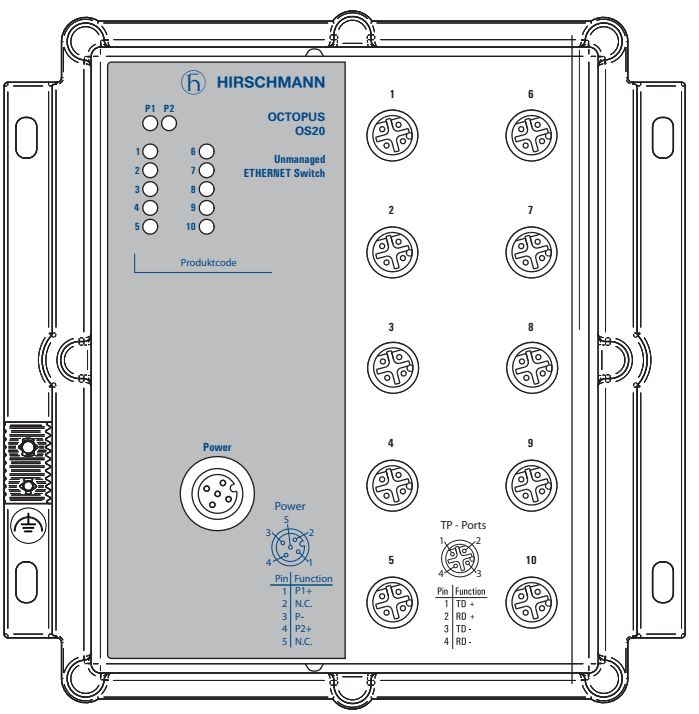
HIRSCHMANN
A BELDEN BRAND

User Manual

Installation
OS20-Unmanaged



OS20–001000T5T5TAFUHB

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You can get the latest version of this manual on the Internet at the Hirschmann product site (www.beldensolutions.com).

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Safety instructions

This documentation contains instructions which must be observed to ensure your own personal safety and to avoid damage to devices and machinery.

Notes on safety

This manual contains instructions to be observed for ensuring your personal safety and for preventing damage. The warnings appear next to a warning triangle with a different heading depending on the degree of danger posed:

Danger!
Means that death, serious physical injury or significant damage to property **will occur** if the corresponding safety measures are not carried out.

Warning!
Means that death, serious physical injury or significant damage to property **could occur** if the corresponding safety measures are not carried out.

Caution!
Means that minor physical injury or damage to property can occur if the required safety measures are not carried out.

Note: Contains important information on the product, on how to manage the product, or on the respective section of the documentation to which your special attention is being drawn.

Certified usage

The device may only be employed for the purposes described in the catalog and technical description, and only in conjunction with external devices and components recommended or approved by the manufacturer. The product can only be operated correctly and safely if it is transported, stored, installed and assembled properly and correctly. Furthermore, it must be operated and serviced carefully.

Certifications product code (see table 2 and table 3)	Operational environment
F	In the inside of buildings In the inside of trains In the inside of ships In the inside of vehicles

Table 1: Operational environment

Warning!
Do not use the device in safety-related applications - in particular where life and limb may be in danger.

Supply voltage

The supply voltage is electrically isolated from the housing.

☐ Use undamaged parts.

☐ Relevant for North America: For use in Class 2 circuits.
Only use copper wire/conductors of class 1, 75 °C (167 °F).

☐ Ensure that the externally power unit connected upstream fulfills one of following conditions:

- NEC Class 2
- Limited Power Source based on EN60950-1

Shielding ground

Note: The shielding ground of the connectable twisted pair lines is connected to the housing as a conductor.

☐ Beware of possible short circuits when connecting a cable section with conductive shielding braiding.

Housing

Only technicians authorized by the manufacturer are permitted to open the housing.
The device is grounded via the separate ground screw.

☐ Make sure that the electrical installation meets local or nationally applicable safety regulations.

Warning!
HOT SURFACE -
RISK OF BURNING!

Warning!
If the surrounding air temperature exceeds 55 °C, install the device exclusively in “restricted access locations” according to EN 60950-1

Environment

The device may only be operated at the specified surrounding air temperature (temperature of the surrounding air at a distance of up to 5 cm (1.97 in) from the device) and relative air humidity specified in the technical data.

- ☐ Install the device in a location where the climatic threshold values specified in the technical data are adhered to. Make sure the environment does not heat the device. It can be mounted on temperature-isolating material.
- ☐ Use the device only in an environment within the pollution degree specified in the technical data.

Qualification requirements for personnel

Qualified personnel as understood in this manual and the warning signs, are persons who are familiar with the setup, assembly, startup, and operation of this product and are appropriately qualified for their job. This includes, for example, those persons who have been:

- ▶ trained or directed or authorized to switch on and off, to ground and to label power circuits and devices or systems in accordance with current safety engineering standards;
- ▶ trained or directed in the care and use of appropriate safety equipment in accordance with the current standards of safety engineering;
- ▶ trained in providing first aid.

General safety instructions

Please note that products recommended as accessories may have characteristics that do not fully correspond to those of the corresponding product. This may limit their possible usage in the overall system. Electricity is used to operate this equipment. Comply with every detail of the safety requirements specified in the operating instructions regarding the voltages to apply (see page 5).

Non-observance of these safety instructions can therefore cause material damage and/or serious injuries.

- ☐ Only appropriately qualified personnel should work on this device or in its vicinity. These personnel must be thoroughly familiar with all the warnings and maintenance procedures in accordance with this operating manual.
- ☐ The proper and safe operation of this device depends on proper handling during transport, proper storage and assembly, and conscientious operation and maintenance procedures.
- ☐ Never start operation with damaged components.
- ☐ Only use the devices in accordance with this manual. In particular, observe all warnings and safety-related information.
- ☐ Any work that may be required on the electrical installation may only be carried out by personnel trained for this purpose.

National and international safety regulations

☐ Make sure that the electrical installation meets local or nationally applicable safety regulations.

CE marking

The devices comply with the regulations contained in the following European directive(s):

2004/108/EG
Directive of the European Parliament and the council for standardizing the regulations of member states with regard to electromagnetic compatibility.

72/245/EWG, 2009/19/EG
Guideline for standardizing the regulations of member states relating to radio interference from motor vehicles. Certified devices are marked with an e1 type approval indicator.

In accordance with the above-named EU directive(s), the EU conformity declaration will be at the disposal of the relevant authorities at the following address:

Hirschmann Automation and Control GmbH
Stuttgarter Str. 45-51
72654 Neckartenzlingen
Tel.: +49 1805 141538

The product can be used in the industrial sector.

- Interference immunity: EN 61000-6-2:2005
- Emitted interference: EN 55022:2006 + A1:2007 Class A

Warning!
This is a class A device. This device can cause interference in living areas, and in this case the operator may be required to take appropriate measures.

Warning!
The assembly guidelines provided in these instructions must be strictly adhered to in order to observe the EMC threshold values.

FCC note:

This device complies with part 15 of FCC rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference; (2) this device must accept any interference received, including interference that may cause undesired operation.

Appropriate testing has established that this device fulfills the requirements of a class A digital device in line with part 15 of the FCC regulations.
These requirements are designed to provide sufficient protection against interference when the device is being used in a business environment. The device creates and uses high frequencies and can radiate same, and if it is not installed and used in accordance with this operating manual, it can cause radio transmission interference. The use of this device in a living area can also cause interference, and in this case the user is obliged to cover the costs of removing the interference.

Recycling note

After usage, this product must be disposed of properly as electronic waste, in accordance with the current disposal regulations of your county, state and country.

About this Manual

The “Installation” user manual contains a device description, safety instructions, a description of the display, and the other information that you need to install the device.

Legend

The symbols used in this manual have the following meanings:

▶	Listing
☐	Work step
■	Subheading

1 Device description

The OS20-Unmanaged devices are designed for the special requirements of industrial automation. They meet the relevant industry standards, provide very high operational reliability, even under extreme conditions, and also long-term reliability and flexibility.

The devices allow you to set up switched industrial ETHERNET networks that conform to the IEEE 802.3 and 802.3u standards using copper wires in a line structure.

The devices work without a fan.

The 10 twisted pair ports are M12 sockets.

The twisted pair ports support:
- Autocrossing
- Autonegotiation
- Autopolarity

Mount the device on a level surface with four M5 screws.

The Hirschmann network components help you to establish continuous communication across all levels of the company. Connect your devices to:
- devices of the Open Rail family
- devices of the MICE family
- backbone devices of the MACH family
- the BAT wireless transmission system
- the EAGLE security system
- products for the LION control room / MACH 100 family

The table 2 informs you about the identification characteristics of your device.

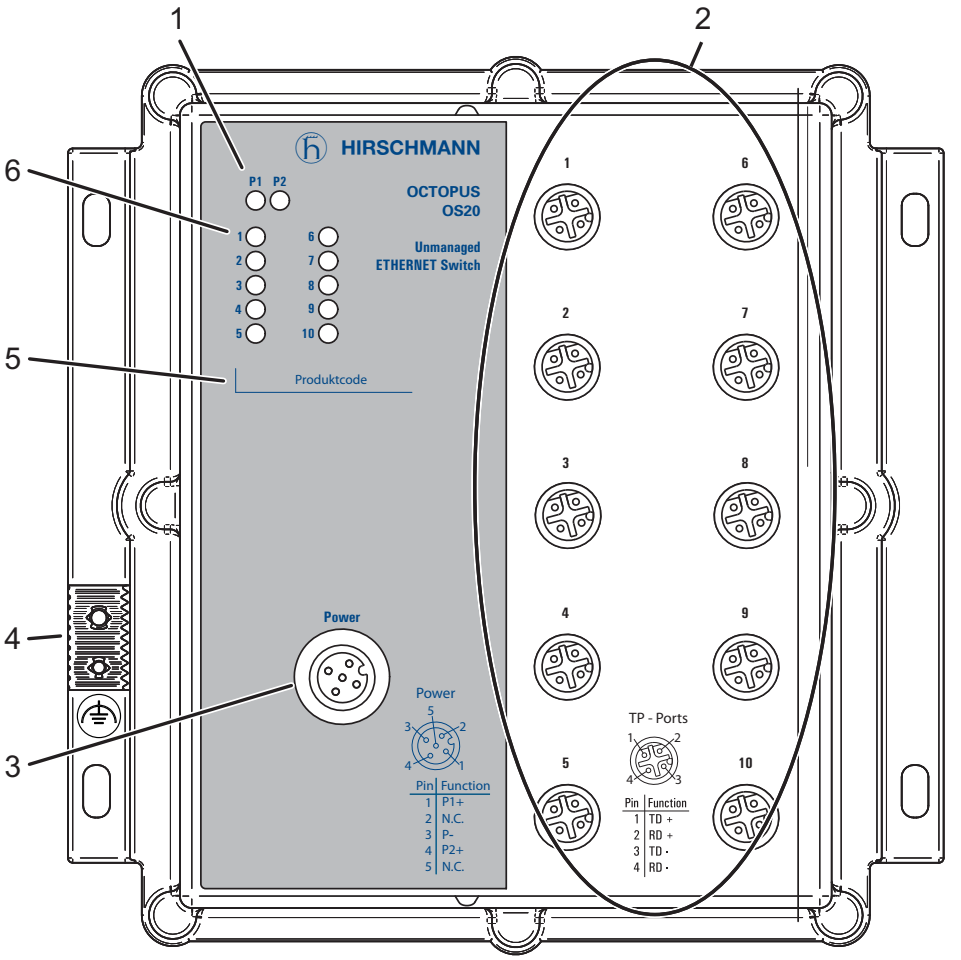
Product code	Order number
OS20–001000T5T5TAFUHB	942 025-001

Table 2: Device types: product code, order number

The product designation of your device is made from combining the product characteristics in accordance with the following table. The corresponding short designation is in column 3.

Item	Characteristic	Characteristic value	Description	
1,2,3,4		OS20	Octopus device	▶ without 1000 Mbit/s ports ▶ without PoE ports
5		–		
6,7	Number: Special ports	00	0 ×	PoE+ ports
8,9	Number: 100 Mbit/s ports	10	10 ×	100 Mbit/s ports (see on page 15 „10/100 Mbit/s twisted pair connection“)
10,11	Number: 1000 Mbit/s ports	00	0 ×	1000 Mbit/s ports
12,13	Uplink ports	T5	1 ×	100 Mbit/s ports (see on page 15 „10/100 Mbit/s twisted pair connection“)
14,15	Uplink ports	T5	1 ×	100 Mbit/s ports (see on page 15 „10/100 Mbit/s twisted pair connection“)
16	Temperature range	T	Extended	-40 °C to +70 °C
17	Operating voltage (see on page 13 „Connecting the plug for the supply voltage“)	A	Rated voltage range DC 24/36/48 V DC **Note:** For the railway standard EN50155 use 24 V DC and 36 V DC exclusively.	
			Max. voltage range DC min. 9.6 to max. 60 V DC (Not for EN/IEC/UL 60950)	
			Connection type	M12
18	Certifications	F	▶ Railway (along track) ▶ Railway (train) ▶ German Lloyd ▶ E1	
19	Software variant	U	Unmanaged	
20	Configuration	H	Hirschmann	
21	Device model	B	IP 54	

Table 3: Combination options



1	LED display elements (see on page 18 „Device state“)	Device Status ▶ Supply voltage 1 ▶ Supply voltage 2
2	100 Mbit/s ports (see on page 15 „10/100 Mbit/s twisted pair connection“)	
3	Connection (see on page 13 „Connecting the plug for the supply voltage“)	Power supply
4	Grounding screw	M3
5	Product code (see table 3)	
6	LED display elements (see on page 18 „Port state“)	port state

Table 4: Overview: display elements and interfaces

2 Assembly and start-up

The devices have been developed for practical application in a harsh industrial environment. The installation process is correspondingly simple.

On delivery, the device is ready for operation.
The following procedure has been proven to be successful for the assembly of the device:

- Unpacking and checking
- Connecting the plug for the supply voltage
- Installing the device and grounding
- Connecting the supply voltage, starting up
- Connecting the data lines

2.1 Installing the device

2.1.1 Unpacking and checking

☐ Check that the contents of the package are complete (see page 20 „Scope of delivery“)
☐ Check the individual parts for transport damage.

2.1.2 Connecting the plug for the supply voltage

A 5-pin M12 connector (A coding, supplied) is used to connect the power supply.

For the supply voltage, the following applies:

- Operating voltage
  - Rated voltage range DC
    24/36/48 V DC
  - Max. voltage range DC
    min. 9.6 to max. 60 V DC

Note: For the railway standard EN50155 use 24 V DC and 36 V DC exclusively.

- The input voltage is electrically isolated from the housing.
- You can supply the supply voltage redundantly, with no load distribution.

Note: Ensure that the externally power unit connected upstream fulfills one of following conditions:

- NEC Class 2
- Limited Power Source based on EN60950-1

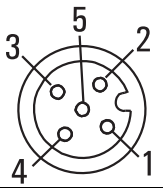
Figure	Pin	Function	Power supply
	1	Plus terminal of the supply voltage	Supply voltage 1
	2	Not connected	—
	3	Minus terminal of the supply voltage	Supply voltage 1 and 2
	4	Plus terminal of the supply voltage	Supply voltage 2
	5	Not connected	—

Table 5: Pin assignment of the 5-pin M12 connector for connecting the supply voltage

2.1.3 Installing the device and grounding

Installing the device

Warning!
If the surrounding air temperature exceeds 55 °C, install the device exclusively in “restricted access locations” according to EN 60950-1

Note: To protect the exposed contacts of the components still to be installed from dirt, connect the individual system components in a dry and clean working area. Seal unused ports with the protection caps supplied.

Note: Connectors are not electrical isolating devices. Therefore, first plug the connector into the power supply plug and then switch on the power supply.

☐ Install the device in a location where the climatic threshold values specified in the technical data are adhered to.
Make sure the environment does not heat the device. It can be mounted on temperature-isolating material.
☐ Prepare the drill holes at the installation point.
☐ Mount the device on a level surface with four M5 screws.

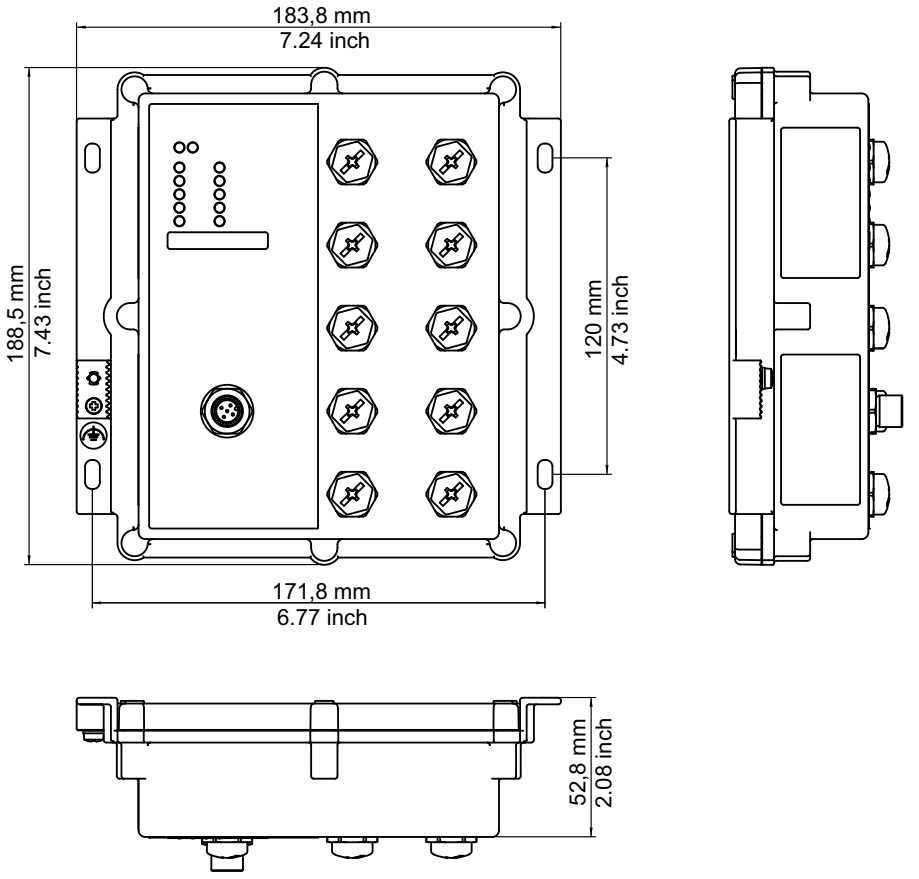


Figure 1: Dimensions

Grounding the device

The device is grounded via the separate grounding screw (M3).

☐ Use toothed washers to ensure good electrical conductivity at the connection.

Note: The shielding ground of the connectable twisted pair lines is connected to the housing as a conductor.

2.1.4 Connecting the supply voltage, starting up

☐ Mount the plug for the supply voltage on the front of the device.
When you connect the supply voltage, you start up the device.

2.1.5 Connecting the data lines

You can connect terminal devices and other segments at the ports of the device via twisted pair cables.

10/100 Mbit/s twisted pair connection

These connections are M12 sockets.

10/100 Mbit/s ports enable the connection of terminal devices or independent network segments according to the IEEE 802.3 100BASE-TX / 10BASE-T standard.
These ports support:

- Autonegotiation
- Autopolarity
- Autocrossing

State on delivery: autonegotiation activated.
The socket housing is electrically connected to the housing.

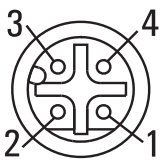
Figure	Pin	Function	
	1	TD+	Transmit Data +
	2	RD+	Receive Data +
	3	TD-	Transmit Data -
	4	RD-	Receive Data -
	Housing: shield		

Table 6: Pin assignment of a TP/TX interface (M12 socket)

☐ Install the data lines according to your requirements.
☐ Use a shielded CAT5 cable.
☐ Use a shielded 4-pin M12 plug.
☐ Connect the cable shield to the connector housing.

The patch cables for operating the device are shown in the following figure:

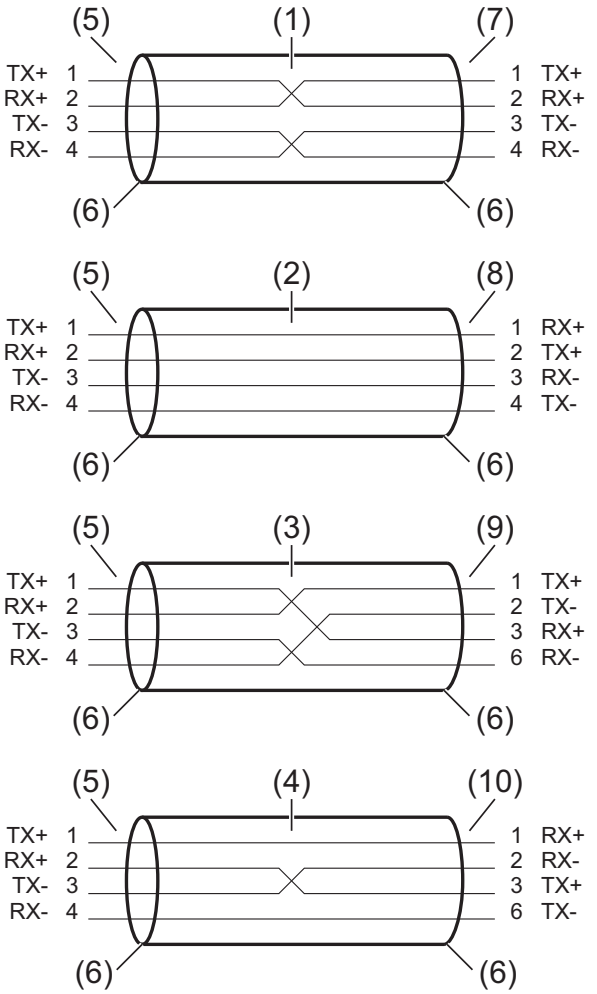


Figure 2: Patch cables for operating the device
(1) - Connection cables M12-4 on M12-4, crossed
(2) - Connection cables M12-4 on M12-4, 1 to 1
(3) - Connection cables M12-4 on RJ45, crossed
(4) - Connection cables M12-4 on RJ45, 1 to 1
(5) - M12 (MDI)
(6) - Shield
(7) - M12 (MDI)
(8) - M12 (MDI-X via autocrossing port)
(9) - RJ45, MDI (terminal device)
(10) - RJ45, MDI-X (Switch)

2.2 Display elements

Note: The table 4 on page 12 informs you about the positions of the display elements.

Device state

These LEDs provide information about conditions which affect the operation of the whole device.

LED	Display	Color	Activity	Meaning
P1	Supply voltage 1	Green	Lights up	The supply voltage is on.
			None	The supply voltage is too low.
P2	Supply voltage 2	Green	Lights up	The supply voltage is on.
			None	The supply voltage is too low.

Port state

The green and yellow LEDs at the individual port display port-related information.

LED	Display	Color	Activity	Meaning
LS/DA	Link status		None	No valid connection
		Green	Lights up	Valid connection
		Yellow	Flashing	Data traffic

3 Technical data

General technical data

Dimensions W × H × D		184 mm × 189 mm × 70 mm
Weight		1300 g
Power supply	Redundant power supply	
	Note: Ensure that the externally power unit connected upstream fulfills one of following conditions: ▶ NEC Class 2 ▶ Limited Power Source based on EN60950-1	
	Operating voltage	Rated voltage range DC 24/36/48 V DC **Note:** For the railway standard EN50155 use 24 V DC and 36 V DC exclusively.
		Max. voltage range DC min. 9.6 to max. 60 V DC (Not for EN/IEC/UL 60950)
Overload current protection at input	Non-replaceable fuse	
Insulation voltage between operating voltage connections and housing		707 V DC
Climatic conditions during operation	Surrounding air temperature	-40 °C to +70 °C
	Humidity	10% to 95% (non-condensing)
	Air pressure	minimum 795 hPa (+2000 m) maximum 1060 hPa (-400 m)
Climatic conditions during storage	Surrounding air temperature	-40 °C to +85 °C
	Humidity	10% to 95% (non-condensing)
	Air pressure	minimum 700 hPa (+3000 m) maximum 1060 hPa (-400 m)
Protection class		IP 54
Mounting	Flat surface mounting	
	Screw type	M5
Pollution degree		2

EMC and immunity

EMV interference immunity		
IEC/EN 61000-4-2	Electrostatic discharge Contact discharge Air discharge	 6 kV 8 kV
IEC/EN 61000-4-3	Electromagnetic field 80 - 2,700 MHz	 20 V/m

EMV interference immunity		
IEC/EN 61000-4-4	Fast transients (burst) Power line Data line	 2 kV 4 kV
IEC/EN 61000-4-5	Voltage surges Power line Power line Data line	 1 kV line / line 2 kV line / earth 1kV
IEC/EN 61000-4-6	Line-conducted interference voltages 150 kHz - 80 MHz	10 V
EN 61000-4-9	Impulse-shaped magnetic fields	300 A/m

EMC emitted interference		
EN 55022	Class A	Yes
FCC 47 CFR Part 15	Class A	Yes
German Lloyd	Classification + Construction Guidelines VI-7-3 Part 1 Ed.2001	Yes
Stability		
Vibration	IEC 60068-2-6 Test FC test level according to IEC 61131-2	Yes
	Germanischer Lloyd Guidelines for the Performance of Type Tests Part 1	Yes
	IEC 870-2-2 table 3 normal installation according to EN 61850-3	Yes
	EN 61373, Category 1, Class A (broadband noise), installation in acc. with EN 50155	Yes
Shock	IEC 60068-2-27 Test Ea test level according to IEC 61131-2	Yes
	IEC 870-2-2 table 3 normal installation according to EN 61850-3	Yes
	EN 61373, Category 1, Class A (broadband noise), installation in acc. with EN 50155	Yes

Network range

TP port	
Length of a twisted pair segment	typ. 100 m (cat5e cable with 100BASE-TX)

Table 7: TP port 10BASE-T / 100BASE-TX

Power consumption/power output

Name	Maximum power consumption	Power output
OS20–001000T5T5TAFUHB	5.8 W	19.8 Btu (IT)/h

Scope of delivery

The cable socket ELWIKA 5012 PG7 (933 175-100) included in the delivery supports a temperature range from -25 °C to +70 °C. It can thus restrict the possible range of usage for the overall system.

Device	Scope of delivery
OS20–001000T5T5TAFUHB	Octopus device
	Cable socket ELWIKA 5012 PG7 for supply voltage
	Protective caps for sealing unused ports
	Installation user manual

Order numbers/product description

You can obtain the product code for the devices (order number) from the above table (see table 2) .

Accessories

Note: Some products recommended as accessories do not support the entire temperature range specified for the device. They can thus restrict the possible range of usage for the overall system.

Note: Unsealed accessory parts are not suitable for use within an IP54 area.
The following accessory parts are unsealed:

- RJ45 adapters

Name	Order number
Pocket Guide	280 710-851
Cable socket ELWIKA 5012 PG7 (5-pin M12 socket for supply voltage	933 175-100
Field-attachable 5-pin M12 socket, A-coded with two cable outputs	RKC5/Duo
M12 connector, D-coded	934 445-001
Connection cable with M12 connector, D-coded	934 497-00x
Transition M12 D-coded to RJ45	934 498-001

Underlying norms and standards

Name	
EN 50121-4:2006	Railway applications - EMC - emitted interference and interference immunity for signal and telecommunication systems
EN 50155:2007	Railway applications - electronic systems in railway vehicles
EN 55022:2006 + A1:2007	IT equipment – radio interference characteristics
EN 61000-6-2:2005	Generic norm – immunity in industrial environments
EN 61131-2:2007	Programmable logic controllers
FCC 47 CFR Part 15:2009	Code of Federal Regulations
Germanischer Lloyd	Ship Applications - Classification and Construction Guidelines VI-7-3 Part 1 Ed.2003
RL 72/245/EWG, 2009/19/EG	e1 type certification for use in vehicles

Table 8: List of norms and standards

The device has a certification based on a specific standard only if the certification indicator appears on the housing.
However, with the exception of Germanischer Lloyd, ship certifications are only included in the product information under www.beldensolutions.com.

A Further Support

Technical Questions and Training Courses

In the event of technical queries, please contact your local Hirschmann distributor or Hirschmann office.
You can find the addresses of our distributors on the Internet: www.beldensolutions.com.

Our support line is also at your disposal:

- Tel. +49 1805 14-1538
- Fax +49 7127 14-1551

Answers to Frequently Asked Questions can be found on the Hirschmann internet site (www.beldensolutions.com) at the end of the product sites in the FAQ category.
The current training courses to technology and products can be found under http://www.hicomcenter.com.

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